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The Impact of New Conventional Technologies on Military Doctrine and Organization in the Warsaw Pact

PHILLIP A. KARBER

A tactical revolution in conventional warfare is in the offing.¹ It is brought by the advances that are being made over the whole range of conventional technology – and not only technology, for radical changes are occurring in tactical doctrine and force structure. For example, every NATO army deployed in Central Europe is undergoing, or has announced, major structural changes in its combatant organizations and is experimenting with radically new tactical employment concepts.

The forces of the Soviet Union are also in the process of radical doctrinal and structural change. But where the majority of Western innovations are based on the anticipated products of advanced technology, for example second generation anti-tank guided missiles (ATGM), the new Chobham armour for tanks, improved conventional munition (ICM) warheads for artillery, cannon-launched laser-guided projectiles, high energy/manoeuvrability tactical aircraft, air-delivered precision-guided munitions, fuel-air explosives, enhanced radiation warheads and highly accurate terrain-following cruise missiles, there is yet no evidence of experimental development or design prototypes of new systems incorporating these technologies within Warsaw Pact forces. What then is driving Warsaw Pact force structural changes and doctrinal re-examination?

The Nuclear Revolution in Soviet Strategy

Over the last two decades the Soviet military have emphasized the importance of what they call the nuclear revolution in military affairs.²

Throughout the late 1950s and mid-1960s the Soviet Union believed that the likely prospect of nuclear weapons being used on the tactical battlefield made linear positional defence operationally untenable – the defender would be forced either to disperse or to face certain destruction. Under such conditions manoeuvre was viewed as the key to operational success. Moving the ground battle to the territory of the defender meant that it would be in his homeland that the majority of tactical nuclear destruction would take place. Since the attacker knew where he was trying to go he could unleash nuclear salvos in the direction of and on the flanks of his advance; if the defender was concentrated, he would be destroyed; if the defence was dispersed, the attacker could be confident of his freedom of manoeuvre. High rates of advance offered the prospect of deep penetration and mingling of forces so that the effectiveness of the defender's use of nuclear weapons was likely to be undermined by his concern over his own troop safety and the cohesion of his rear area. The massing of combat formations – a historical characteristic of Soviet operations which was viewed as a critical vulnerability – and the concept of concentrating for a breakthrough were abandoned in favour of dispersed multiple axes of advance across the breadth of the front.

Since any European conflict was assumed to be nuclear from the outset, conventional artillery assets and supporting structures for sustained conventional combat were cut drastically between 1958 and 1965. The primary nuclear delivery role was transferred from aircraft to

surface-to-surface missiles, with frontal aviation largely directed to the role of defending Warsaw Pact air space against NATO nuclear-strike aircraft. Even greater emphasis was placed on the tank as a mobile firing platform with high survivability, and an extensive effort was undertaken to bring about the full mechanization of infantry.

It would be misleading, however, to assume that this streamlining of Warsaw Pact force structure was driven by doctrinal requirements alone. Resource limitations played a major role. In the late 1950s and early 1960s the Soviet Union faced a severe manpower shortage in her draft due to the extensive population losses of World War II. While primary emphasis was given to a build up of strategic rocket forces, the political élite attempted to redirect the economy from post-war reconstruction, the large standing Soviet conventional military structure was severely cut, and Soviet army manpower was reduced by almost a half; the number of divisions was decreased drastically, with the remainder being either streamlined or placed on cadre status.³

By the mid-1960s, however, the Soviet Union began to consider a conventional variant to her theatre warfare doctrine, recognizing that political conditions might preclude the immediate use of nuclear weapons.⁴ The Soviet conventional variant presumes that the non-nuclear stage of the conflict will last only a few days. If the attack succeeds, the defender is likely to initiate nuclear strikes. If, on the other hand, the defence holds, and the attack seems highly likely to become bogged down in a protracted conflict, it will be the Soviet Union who initiates nuclear fire in order to force the defender to disperse and open up the battlefield to offensive manoeuvre. Contrary to NATO's faith in the defensive value of tactical nuclear weapons, the Soviet Union clearly believes that the initiation of nuclear fire by either side merely ensures her own offensive success by maximizing high rates of advance deep into NATO's rear area.⁵

Nevertheless, the adoption of a conventional variant presented the Soviet Union with some fundamental problems. Because of the omnipresent realization that a conflict might turn nuclear at any moment, the Soviet Union gave the need to suppress NATO's nuclear delivery systems during the conventional phase of battle

the highest priority. A long period of mobilization would give the West time to disperse its warheads and delivery systems and, even if these could be discovered, the inaccuracies of conventionally armed surface-to-surface missiles and the inherent limited range/payload of frontal aviation interceptors offered the Soviet Union little prospect of degrading NATO's nuclear capability during the conventional stage of conflict. Clearly, forward-deployed ground forces of the Warsaw Pact did not have sufficient fire-power or logistical stamina to engage successfully in prolonged non-nuclear hostilities. While massive mobilization and reinforcement of Soviet forces from the Western Soviet Union could provide the additional mass needed to break through mobilized NATO defences, the tactical concentration required would render them most vulnerable to NATO's first use of nuclear fire. It is these conflicting aims – to degrade NATO's nuclear capability conventionally and to penetrate deep yet avoid massing – which have had a continuing impact on Soviet doctrinal and structural anticipation of the effect of new conventional weapons technology on the stability of Western defences.

Warsaw Pact Reaction to New Technologies

The initial Soviet reaction to the conflicting problems they faced with the adoption of a conventional variant strategy was to increase the quantity and quality of their forward-deployed conventional assets in Central Europe, and over the last decade the range and payload of frontal aviation has more than doubled. Since the mid-1960s, the Warsaw Pact ground forces have added over ten thousand major items of combat equipment – tanks, armoured personnel carriers (APC) and artillery. The Warsaw Pact – NATO tank ratio within the Mutual and Balanced Force Reductions (MBFR) area alone has increased in the Pact's favour from 2:1 to 2.7:1, and the artillery ratio from 1.5:1 to 2:1.⁶

But merely increasing the quantity and quality of their forward-deployed forces was not enough. As the Soviet Union learned in both the 1967 and 1973 Middle East wars, the basic nature of conventional combat was in a state of dynamic change, and if her offensive doctrine was to remain viable there had to be fundamental alterations in their operational concepts and force structure. This imperative for change has

been magnified by the repeated heralding of technological advances in conventional weapon technologies within the West and has produced an almost paranoic fear of being caught off-guard and deep Soviet concern that their offensive doctrine might be pulled to pieces. Realizing that they lagged behind in technological innovation the Soviet High Command has sought compensatory developments in tactical innovation and structural integration to offset the threat posed by advanced Western technology.

After both the 1967 and 1973 wars in the Middle East, the Soviet Union experimented through large-scale field exercises to an extent unmatched in the West. There is also growing evidence that, rather than working *ad hoc* and incremental solutions, the Soviet Union has attempted to integrate all aspects of her existing theatre warfare capabilities into a comprehensive doctrine.

There are two major differences, however, between the dynamic doctrinal discussions carried on during the nuclear revolution of the 1950s and the early 1960s and the current approach to the tactical revolution in conventional warfare – elements that are increasingly notable for their absence. What is missing today is evidence of the political conservatism that dominated Soviet military thinking during an era when they perceived themselves to be in a position of strategic inferiority, and – equally important – there is no evidence of the severe resource restraints which were dominant in the early 1960s. Rather, one finds increasing evidence of Soviet belief that, in an era of strategic parity, conventional warfare can be conducted with growing immunity below the nuclear threshold and, at the same time, resources committed to ground, naval and tactical air forces seem to be increasingly available.

While Soviet discussion of the impending tactical revolution has permeated all aspects of their conventional combatant and supporting arms, three areas have received particular attention within the last few years: the operational viability of armoured forces, the structural integration of fire support and the changing role of frontal aviation.

Change in the Operational Doctrine of Armoured Forces

With the Soviet Union's acceptance of a multi-varient conventional option to her theatre war

strategy, she identified several objectives for the initial non-nuclear phase of battle: deep inter-penetration of the attacking units within the defender's position so as to reduce their own exposure as a potential nuclear target; destruction of the defender's 'means of nuclear attack' and 'seizing and holding important regional areas' which are not only hostages to inhibit the defender's initiation of nuclear fire but also the very conditions of victory in a 'limited' (non-strategic) war.⁷

During 1974, the Soviet military apparently conducted extensive field testing and unit exercises against strengthened anti-tank defences and discovered that not only did they greatly increase the stability of the defence against frontal armoured breakthrough but that their infantry combat vehicle, the BMP, was the weak link in their combined arms formations. This stimulated a major debate during 1975 on the options for keeping Soviet offensive doctrine viable in a conventional conflict.⁸ In 1976, as a result of these discussions, the High Command initiated a doctrinal revolution in Soviet thinking with a call for 'new tactical methods'.⁹

In the light of the increased concern over anti-tank weapons the positions taken by the Soviet military officers were very significant. First, nowhere did they attempt to deny the effectiveness of anti-tank weapons or denigrate the increased attention given them. Second, while some armour advocates seemed willing to rely on shock effects by increasing the speed of assault and massing more tanks in echelon, there was recognition that at best this tactic can be applied only to overcome a thinly spread defence and could, if wrongly employed, create *débâcle*. Third, the armoured forces did not at all relish the prospect of a fire-power battle with its attendant slower rate of advance and high attrition. They proposed instead to deal with the anti-tank threat to movement with greater rather than less emphasis on manoeuvre, i.e. increased reliance upon surprise.

What seems to bother Soviet writers about anti-tank weapons is less their specific technological characteristics than the growing density of their deployment. The Soviet Union has long held that density – the ratio of force to space – is the key variable influencing rate of advance. The greater the quantity of force in a given area, the slower the movement; conversely, with a low

force-to-space ratio, the battlefield becomes granular rather than linear, fluid instead of static.

In lieu of nuclear weapons to force the defence to disperse, the armoured advocates now call for pre-emptive manoeuvre – attacking the defence before it mobilizes and can deploy a dense anti-tank defence. Soviet writers note that pre-emptive manoeuvres with conventional weapons offer the same opportunities as nuclear strikes, that is, low force densities, fluidity of manoeuvre and a high initial rate of advance.¹⁰

Thus there are several indications that in the event of conflict with NATO the Soviet High Command would prefer to launch an unreinforced attack, not relying upon massive mobilization of the rear echelon divisions in the Soviet Union or the filling out of under-strength Warsaw Pact forces. Such an attack, with in-place theatre forces, would have a high prospect of catching NATO before (or in the process of) mobilization and deployment, precluding the West from establishing and subsequently reinforcing dense forward anti-tank defence. This would permit the Soviet Union to concentrate their forces against the weakest zones of the defence and retain a high potential for a rapid advance.

The key for the Soviet Union is not quantitative superiority but the extent to which the defence has had time to mobilize and deploy a prepared defence. Through the achievement of pre-emptive manoeuvre the Soviet military believe that deep penetrations can be mounted successfully against a quantitatively equal opponent, whereas in the face of a well-prepared defence they would have to conduct a massed frontal breakthrough, which is perceived as being increasingly difficult in the face of large quantities of the new anti-tank weapons employed by the defence. Soviet authors note that the mechanization of infantry not only makes indirect artillery preparation less effective (because the defenders are protected by their armoured vehicles) but also that high mobility permits the defender to withdraw rapidly from the fire zone or quickly create a second defensive zone by bringing up reserves from the rear or shifting forces from flanks not under massive attack. The increased range of anti-tank weapons may permit the defence to deploy in greater depth, which places greater demands on sup-

pressive fire. Moreover, there is a limit to the amount of forces the Soviet Union believes she can mass in a given area. She has repeatedly pointed out that the requirements imposed by nuclear weapons for dispersal must not be violated even during the conventional phase of the battle. Even with massive mobilization, Soviet and Warsaw Pact forces would only have the resources to conduct one or two massed breakthroughs simultaneously across the breadth of the Central Front. Each of these would be time-consuming, require inordinate resource expenditure and, because they would give time for the defender to react, would not offer high prospects of success.

NATO's potential anti-tank capability clearly worries the Soviet Union and has forced her to develop new operational concepts. But NATO can hardly take heart: the new Soviet concepts exploit current NATO vulnerabilities and are destabilizing for Europe. Even worse, NATO's anti-tank defensive potential, having triggered a Soviet response, has not yet been sufficiently implemented to deal with that reaction.¹¹

It is becoming increasingly clear that, while the Soviet High Command has not abandoned its belief in armoured forces as the main strike force in a theatre campaign,¹² the era of sole reliance upon large tank-heavy formations exploiting mass breakthroughs conducted by divisional and army-size formations is waning, to be replaced by heavier emphasis upon pre-emptive attacks carried out with smaller, fully-integrated combined-arms units consisting of tanks, mechanized infantry, self-propelled artillery, mobile air defence, and supported by an expanded organic, logistic capability.¹³

Over the last decade the Warsaw Pact has almost doubled its artillery assets at division level and a noticeable change in doctrine and structure became apparent after the 1973 Middle East war. This change was a response to what were seen as two major challenges.¹⁴ First was the realization that, in the face of increased anti-tank defences, artillery was a prime means of suppression. Second, the Soviet Union noted that self-propelled artillery greatly increased the survivability of artillery units against counter-battery fire, both through its armoured protection and its ability to disperse quickly.

With the adoption of conventional deep-penetration tactics by the tank and mechanized

infantry forces came the realization that units of reinforced regimental size needed organic artillery of battalion strength which could keep pace with their fast movement. These requirements were formulated at about the same time that the new Soviet self-propelled 122mm and 152mm artillery became available. Keeping the towed artillery as a divisional resource, the new self-propelled 122mm guns have been introduced as organic equipment in tank and motor rifle regiments, mirroring NATO fire-power. Moreover, the Soviet Union has gone one step further in lowering the level of combined-arms integration by frequently attaching self-propelled batteries to first-echelon manoeuvre battalions. She realized that to suppress defending anti-tank positions by direct fire was more than ten times as effective as indirect fire of the same calibre. With self-propelled artillery opening fire directly behind the assaulting battalions, the fire-direction officer can locate individual defending positions from the signatures of their weapon systems and engage them directly, rather than going through the time-consuming and less accurate process of on-call support based on indirect fire.

This new approach highlights a major divergence between what the Soviet Union sees as the requirements of the battlefield and the view in the West. Whereas NATO forces are relying increasingly on complex command, control and communications technology to attain maximum efficiency from limited artillery assets, the Soviet Union, while appreciating the technologies involved, argues that this approach is seriously flawed because it becomes heavily dependent on a communications network which can be disrupted and targeted.¹⁵ In order to exploit this vulnerability, the Warsaw Pact forces are increasingly introducing new armoured vehicles mounting target-acquisition radar and 152mm guns for counter-battery fire coupled with electronic warfare techniques to engage critical rear-area targets. There is also evidence that the Soviet Union is reconsidering the value of accurate, low-yield cannon-fired nuclear warheads to be used in closer proximity to the immediate battle.¹⁶ There is as yet no evidence of Warsaw Pact deployment of new conventional fire support technologies such as sub-munitions which increase the lethality radius of a given shell against infantry four-fold, RAP rounds

(Rocket Assisted Projectiles which can double the range of artillery), or terminally directed CLGP (Cannon Launched Guided Projectiles, which through laser designation can improve accuracy by a factor of ten). When these technologies become available in the East, however (and there is no technological obstacle to mass production other than resource allocation) there will be a severe suppression threat even to a prepared NATO defence.

Role and Mission of Frontal Aviation

In the past, Soviet reliance on surface-to-surface missiles has tended to reduce reliance on Frontal Aviation. Unlike NATO, which has continued to rely on tactical aircraft for nuclear deep-strike missions, the Soviet Union concluded that SSM were much better for this role. They have much greater pre-launch survivability than aircraft. Their reliability, penetrability, range and accuracy in attacking fixed targets made them better than manned aircraft. This orientation to SSM tended to retard the development of Warsaw Pact Frontal Aviation throughout the 1960s. The primary role of Frontal Aviation was to intercept penetrating aircraft.

The 1967 Middle East war resulted in a major reorientation of Soviet thinking. It was at once challenging and threatening, for it demonstrated that tactical air forces could achieve decisive results with conventional weapons in the first hours of a conflict. Thus there seemed to be a new offensive mission for Frontal Aviation under a conventional variant strategy, although the war also highlighted the vulnerability of airbase supporting structures to pre-emption.

Following the 1967 war the air forces of both sides began significant shelter construction programmes, but the Warsaw Pact clearly attached more importance to it. They were adding to their number of aircraft shelters at roughly twice the rate of NATO and, while NATO shelters were neither designed for heavy blast protection nor for aircraft to rearm and refuel, the Warsaw Pact designed them for greater hardness, carefully concealing them through the use of ground cover. The shelters also provided protection for all airbase functions, including command and control. The Warsaw Pact shelter programme, coupled with other improvements (a dense redundant high/low surface-to-air missile belt, extensive point defence by radar-directed guns, and a

significantly larger quantity of bases, emergency aprons and dispersal strips) effectively denied NATO the option of attempting to gain theatre air superiority by conventional airbase attack.

By the early 1970s the offensive role and capabilities of Warsaw Pact Frontal Aviation began taking shape. They began to deploy large quantities of highly effective air-defence guns (ZSU-23/4) and battlefield missile systems (SA-4, SA-6, SA-7, SA-8, SA-9) to free Frontal Aviation from its defensive bias. At the same time they introduced a whole new series of advanced fighters (MiG 21 J, K, L, MiG 23, Su-17, Su-19) was introduced with a range and payload capability sufficient to endanger NATO's rear area. Returning to a tactical air strategy reminiscent of World War II, the Warsaw Pact now appears to have adopted a centralized air offensive campaign to pre-empt NATO's tactical air forces, disrupt vulnerable rear-area command and control systems and degrade Western nuclear delivery capability during the early hours of the conventional battle.¹⁷

While the advantages of precision-guided munitions (PGM) seemed at first to favour the West, the introduction of these systems into the Warsaw Pact now suggests that early commentaries were misguided. It is highly likely that the PGM revolution will actually do more to increase the offensive power of Warsaw Pact Frontal Aviation than it will benefit NATO's defensive air power. There are several reasons for this. First, while even the latest Soviet aircraft are still inferior in range and payload to the majority of NATO fighters, the number of PGMS carried tends to be restricted in other ways than by payload alone. Given that Warsaw Pact combat aircraft outnumber NATO's by 2-to-1 in the Central Region, performance will still be offset by numbers. Second, stand-off PGMS will automatically increase the range of Warsaw Pact aircraft, bringing NATO rear targets well within their reach. Third, the less demanding proficiency required for a PGM delivery will tend to compensate for the lower training levels of the average Warsaw Pact pilot. Fourth, there is a major difference in the targets each side will aim for. NATO tactical aircraft (trying to offset the ground imbalance) will attempt to knock out tens of thousands of mobile dispersed hard or semi-hard targets extensively protected by the densest low-altitude air defence system in the world (3,500

air-defence guns and 1,500 SAMS).¹⁸ On the other hand, Warsaw Pact tactical aircraft are likely to utilize PGMS against NATO's rear targets which are fixed, generally soft and relatively few in number.

Since the integration of Frontal Aviation in support of the Warsaw Pact ground-attack forces, the traditional Soviet emphasis has been on preplanned aerial bombardment for suppressive effect in the area of breakthrough beyond the range of artillery. Frontal Aviation is now increasing its ground-attack capability by introducing specialized aircraft, dual-purpose fighters with greater payload, improved munitions and more air-to-ground training. How the Warsaw Pact is to make use of these new assets is still in doubt. The use of high-performance aircraft as aerial artillery is not easy. The Soviet Union has neither the experience nor the command and control facilities for the kind of close support developed by NATO. Attrition will be very high though NATO air defence is neither as dense nor as effective as that of the Warsaw Pact. In fact, their own air defences are likely to be a serious threat to these aircraft. If Warsaw Pact ground-attack aircraft are to be effective over the battlefield, there will be increased opportunity for NATO tactical aircraft to penetrate the Pact's air defence. Moreover, the proliferation of low-altitude missile and gun systems present a severe problem in co-ordinated air-space control. During a fluid battle, the close support command, control and acquisition problems are not easy and do not fit the current rigidity of Soviet close-support tactics.¹⁹ There appears to be a trend towards a diversion of labour in Frontal Aviation with fixed-wing attack aircraft mounting search-and-destroy operations behind the battlefield with *Hind* armed assault helicopters providing on-call close support for the deep-penetration units. While the number of Warsaw Pact armed helicopters is relatively small (several hundred) for the task, there is evidence that the Soviet Union is pushing strongly in this direction.²⁰

Future Trends

It is one thing to examine Warsaw Pact doctrinal and organizational patterns in what has already happened and to analyse current debates, but quite another to prophesy what will come next. The following are speculations only.

Redressing the Conventional Balance by the mid-1980s

The Warsaw Pact has reacted to Western technological innovation in conventional weaponry with a high degree of doctrinal flexibility but there is a point beyond which even the most sophisticated tactics cannot cope with advanced technology, and there are limits to how far quality can be matched with quantity. There is no evidence to show that the expansion of the Warsaw Pact conventional force structure over the last decade has reached its limit. The evidence would suggest just the opposite: that in anticipation of each new challenge forces are enlarged and improved. Warsaw Pact tank assets may grow by 25 per cent if the East European and Soviet tank units follow the trend set in Soviet motorized rifle units in going from a 3 to a 4 tank platoon and other increases can be expected. However, if this growth continues, the Warsaw Pact will face substantial costs. In the past, they have achieved a much more efficient use of manpower than NATO by manning more weapons *per capita*, but the addition of more combat equipment in operational units will require much heavier manning levels to cope not only with the growth of equipment but to maintain it. Manpower is not a problem for Soviet forces at present but by the mid-1980s the Soviet Union will be feeling the effects of her second post-war decrease in population, and manpower may again be in short supply. It is hard to foresee how she will be able to maintain both the force deployments opposite China and the expanded air, ground and naval conventional capability that her current doctrine requires in Europe.

By the mid-1980s, NATO's conventional forces should be radically modernized with advanced technology, and the improvements should generally enhance defence over offence. Many Soviet systems will be at least twenty years behind in design. Given the lack of evidence of Soviet prowess in such areas as Chobham armour, ICM warheads and micro-miniature electronics, a large-scale deployment by NATO of new systems incorporating these technologies has the potential once again to redress the quantitative imbalance through qualitative advantages.

While none of these new technologies should be beyond the grasp of the Warsaw Pact in the next ten years, an arms race would be an expensive proposition for the Warsaw Pact for it has

to modernize at least twice as large a force. Already the current modernization programme is having a debilitating effect on Warsaw Pact standardization and logistics – traditionally viewed as problems which solely concerned NATO. For example, Warsaw Pact operational units include three different main battle tanks, each requiring different ammunition, and their troops are riding in five different APCs with non-interoperable parts. Moreover, there is a widening gulf between the equipment of Soviet Forces and that of the East European allies, not only in armoured systems but also in artillery and particularly in tactical aircraft.

NATO's force modernization and Warsaw Pact resource standardization and logistic problems alter the prospect of stabilizing the conventional military balance in Central Europe by the mid-1980s.

Interim: Worse Before Better

While the long-term outlook may be fairly bright (if NATO acts in time and with sufficient effort) the immediate prospect is not. There are several reasons for this. First, between now and the early 1980s we can expect the quantity and particularly the quality of Warsaw Pact forces to continue to grow. The East Europeans, who have lagged behind Soviet forces for several years, seem to be in the process of initiating substantial expansion programmes. Within the next few years the Soviet forces deployed in the forward area will have completed the current modernization effort and will thus be qualitatively equal to the best of NATO's deployed technology.

Second, while the West has shown itself adept in design, slow deployment of the new systems will mean that the majority of this new technology will not redress the balance until the mid-1980s. Three current new technologies are clear evidence of this: ATGM, sub-munitions for artillery and PGM for tactical aircraft. In each case NATO has not realized their theoretical potential due to poor design and resource limitations.

Third, perhaps the most negative impact of new Western conventional technology has been the unintentional effect on Warsaw Pact theatre warfare doctrine already mentioned. The combination of early heralding of advanced technology and lags in deployment has at once fuelled Soviet paranoia at being technically behind and stimulated the Pact to adopt what they see as

suitable operational concepts. Thus, realizing that anti-tank guided weapons greatly increase the stability of a prepared defence, the Soviet High Command has placed a premium on pre-emptive manoeuvre – attacking before the defence has had time to mobilize and deploy. Recognizing the offensive potential that new technology provides for tactical aviation has led the Warsaw Pact to target Frontal Aviation against NATO's vulnerable rear area, relying on an air campaign which depends upon surprise to deny the West a militarily useful nuclear option.

The Nuclear Threshold

In the near future the destabilizing nature of the new Soviet ground and tactical air doctrines of pre-emption is likely to increase NATO dependence upon nuclear weapons to compensate for its conventional imbalance and lack of force readiness. There will undoubtedly be those who look to the enhanced radiation warhead (neutron bomb) and the cruise missile as technological solutions. Both these systems will be available for earlier deployment than the majority of the new conventional weapons technology but such faith is likely to be misplaced.

Soviet nuclear artillery warheads would give the Warsaw Pact the ability to offset NATO's current advantage in having responsive, accurate and low-yield systems which could be employed in direct support of engaged units. It is far from obvious that, if both sides possess nuclear artillery, there is inherent advantage to the defender. The SS-20 and Soviet standoff air-delivered nuclear missiles, together with the extensive preparations made by the Warsaw Pact to have forces ready for a theatre nuclear conflict, may make first use of nuclear fire increasingly unattractive.

Over the long term, as Western advances in conventional capabilities redress the quantitative imbalance through qualitative superiority, it may be that the Warsaw Pact will come to view tactical nuclear weapons as the only medium through which to maintain their theatre offensive doctrine. In an era of strategic parity we may increasingly face a Soviet political and military strategy which, rather than seeking to break the linkage between conventional defence and nuclear deterrence, attempts to widen the gap between theatre nuclear coercion and the parity of the strategic balance.

NOTES

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² Lt. Gen. Resnichenko (ed.), *Tactics* (Moscow), 1966; P. M. Petrus, P. V. Shemansky, N. K. Chulsky, *Nuclear Weapons and the Development of Tactics* (Moscow), 1967; Marshall Malinovsky et al. (eds), *Problems of the Revolution in Military Affairs* (Moscow), 1965; P. M. Derezhko, *The Revolution in Military Affairs; Wherin Lies Its Essence* (Moscow), 1967; Col. V. Y. Savkin, *The Basic Principle of Operational Art and Tactics* (Moscow), 1972; Col. A. A. Sidorenko, *The Offensive* (Moscow), 1970.

³ For review see T. W. Wolfe, *Soviet Power and Europe 1945–70* (Baltimore: Johns Hopkins Press, 1970).

⁴ For a comprehensive explanation of the Soviet 'conventional variant' see John Erickson, *Nato Modernization and Soviet Theatre Forces* (University of Edinburgh, December 1976), and his *Soviet Military Power*, RUSI, May 1971.

⁵ The issue of Soviet nuclear first use was examined with

insight by Jeffrey Record, 'Warsaw Pact Pre-emptive Attack' in B. A. Wellnitz (ed.), *Los Alamos Scientific Laboratory Panel on Tactical Nuclear Warfare Report*, 5–6 April 1977.

⁶ Quantitative data on the changing NATO/Warsaw Pact military balance between 1965–75 was drawn from P. A. Karber's 'Evolution of the Central European Military Balance', *Statement prepared for hearings on Western Europe: Military and Security Issues*, Committee on International Relations, House of Representatives, Congress of The United States, 14 June 1977.

⁷ See for example Col. Gen. M. T. Nikitin, 'To Develop the Art of Conducting Battle', *Military Herald* No. 10, October 1968.

⁸ For an early review of these discussions see P. A. Karber, 'The Soviet Anti-Tank Debate', *Survival*, June 1976.

⁹ See for example General of the Army, Chief of the General Staff of the Armed Forces, First Deputy Minister of Defence V. Kulikov, 'Soviet Military Science Today', *Communist*, May 1976. Kulikov was afterwards promoted to Chief of Warsaw Pact Forces and has been made a Marshal.

¹⁰ Major Yu. Pivovav, 'Surprise in Combat', *Military Herald* No. 2, 1976. From 1965 several Soviet writers

began to link surprise, low density and high rates of advance. See A. A. Bulatov, V. G. Prozorov, *Tactical Surprise* (Moscow), 1965; Lt.-Gen. I. G. Zavyalov, *Speed, Time and Space in Modern Warfare* (Moscow), 1965; and V. Y. Savkin, *Tempo of Offensive* (Moscow), 1965. This emphasis upon speed was carried over to the 1967 Dnepr and 1970 Dvina exercises and gradually separated from its nuclear association - Zavyalov, 'Speed, Space and Time in Modern Warfare', *Soviet Military Review*, November 1967; Col. P. Berezhnov, 'Speed and Battle', *Soviet Military Review*, January 1970; and Col. V. Savkin, 'Factor of Time in Battle', *Military Herald* No. 4, April 1971.

¹¹ At present the Western forces deployed in Central Europe have half the number of ATGM launchers than they have tanks; the majority of these are not vehicle-mounted and cannot be fired or loaded under armoured protective cover. Today the opposing Warsaw Pact forces in Central Europe alone have more ATGM launchers than the NATO units. See Karber, *op. cit.* in note 6.

¹² Marshal of Armoured Troops O. Losik, 'The Main Striking Force', *Red Star*, 12 September 1976; Maj.-Gen. Pavel Ivanovich, 'Tank Troops Landed', Broadcast, 13 September 1976.

¹³ In 1975 several Soviet commentators used the expressions 'daring raids' or 'bold thrusts' to describe the new tactics for deep penetration of an unprepared or mal-positioned defence. These articles were distinguished by the rank and authority of the authors and their repeated citation of the personal interest in this issue of then Minister of Defence Grechko and Commander-in-Chief of Soviet Ground Forces Pavlovsky. Some Western commentators view this as nothing more than the traditional Soviet concept of a tactical raid of small units, and thus not significant. However, the Soviet usage talks of raid tactics and daring thrusts into the depths of enemy defences, with combined-arms teams of at least battalion-size. Col.-Gen. V. Merimsky, 'The BMP in Battle', *Military Herald* No. 3, March 1976; Maj.-Gen. I. Skorodumov, 'An Attack at High Speed', *Military Herald* No. 3, March 1975. Lt.-Col. Molozev, 'Utility of the BMP in Battle', *Military Herald* No. 11, November 1975. Lt.-Gen. of Tank Troops A. Bondarenko, 'On the Utility of BMPs in Battle', *Military Herald*, October 1975.

¹⁴ Col. A. Rodin, 'Struggle between Artillery and Antitank Weapons', *Military Herald* No. 5, May 1974. Lt.-Gen. V. Kortichuk, 'The Struggle with Antitank Means in the Offensive', *Military Herald*, June 1975. Col. V.

Selyavin, 'Direct Fire', *Soviet Military Review*, November 1975. Marshal of Artillery G. Povedelsky, 'Tactical Training of Ground Forces, Missile Troops and Artillery', *Military Herald* No. 5, 1976. Lt.-Gen. of Artillery A. Sapozhnikov and Lt.-Col. G. Ustavshchikov, 'Trends in Development of Self-Propelled Artillery', *Military Herald* No. 8, 1976. Lt.-Col. A. Mina, 'Destruction of Defending Batteries', *Military Herald* No. 11, 1975. Lt.-Col. I. Yepifanov, 'On the Matter of Survivability of Artillery Units', *Military Herald* No. 4, 1976.

¹⁵ Col.-Gen. D. Grinkevich, Chief-of-Staff, Group of Soviet Forces, Germany, 'Control of Troops at the Level of Modern Demands', *Military Herald* No. 4, 1976. Lt.-Gen. Tyagunov, 'Efficiency in Troop Control', *Military Herald* No. 8, 1976. See also Lt.-Col. A. Spitsyn, 'Restoration of Control of Troops', *Military Herald* No. 9, 1976.

¹⁶ Reznichenko, 'The Role and Place of Tactics in Modern Warfare'; Col. P. Grigoryev, 'Development of Cannon Artillery', *Soviet Military Review*, August 1971; Sapozhnikov and Ustavshchikov, *op. cit.* in note 14; Drew Middleton, 'Anxieties about NATO', *New York Times*, 10 December 1976, p. A2; 'Rote Atomkanone', *Die Welt*, 26 August 1976, p. 1.

¹⁷ For a discussion of the Soviet/Warsaw Pact use of Frontal Aviation and long-range bombers in the conventional air operation see *Military Operations of the Soviet Army*, USAFTA Report 14.U.76, US Army, Washington DC, May 1976, pp. 241-5. For data on the growth of Soviet and Warsaw Pact tactical air capabilities, see R. Meller, 'Europe's New Generation of Combat Aircraft - The Increasing Threat', *International Defense Review*, April 1975; and Benjamin Schemmer, 'Soviet Build-Up on Central Front poses New Threat to NATO', *Armed Forces Journal International*, December 1976.

¹⁸ Numbers of systems counted include only those Soviet/Warsaw Pact forces currently deployed in Central Europe - the territory of East Germany, Czechoslovakia and Poland. With reinforcement these quantities would increase by approximately 50 per cent.

¹⁹ For a biting critique of this problem see Lt.-Col. A. Zakharenko, 'The Lessons of Co-ordination', *Red Star*, 5 August 1977.

²⁰ For example, see Col. M. Belov, 'Helicopters in Anti-tank Warfare', *Military Herald* No. 2, February 1974; Belov, 'Air Mobilization of Modern Armies', *Soviet Military Review*; Lt.-Col. V. Trachenko, 'The Helicopter against Tanks', *Technology and Armament*, August 1975; Belov, 'Helicopters and Land Force Tactics', *Soviet Military Review*, December 1976.